Docket No. 56301P493C
Express Mail No. EV339917247

UNITED STATES PATENT APPLICATION

FOR

A METHOD AND AN APPARATUS FOR A PORT ACCESS SYSTEM

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A METHOD AND AN APPARATUS FOR A PORT ACCESS SYSTEM

BACKGROUND

Cross-Reference To Related Application

[0001] This application is a continuation of co-pending U.S. Patent Application No. 09/607,873 filed on June 30, 2000.

Field of the Invention

[0002] This invention relates generally to intravascular assemblies, and more specifically to a port or implantable pump access system.

Background

[0003] Intravascular devices such as port access systems are generally used for passing fluids between a device such as a syringe or a drip to or from body lumens such as veins or arteries, or other internal target sites. Such an assembly usually includes a means for transferring fluids to a needle such as a tube. The sharp tip of the needle is used for piercing a body lumen so that access may be gained into the body lumen by the needle. Once the needle is located within the body lumen, the needle is removed and discarded while the tube remains in the body lumen.

[0004] Current port access systems involve insertion of a non-coring needle or huber needle that is winged or the standard type of needle into a port secured to a patient. Once the needle is inserted into the patient, the wings of the port access system are taped down and used for infusion of liquids. The needle is removed manually which sometimes results in the needle inadvertently repuncturing the patient's skin or causes an accidental needle stick to the healthcare worker. It is desirable to have a port access system that allows infusion of liquids into a patient but also reduces the risk of an inadvertent needle puncture to a healthcare worker or to the patient.

SUMMARY

[0005] An apparatus and a method are disclosed comprising a housing having a port adapted to receive a moveable first member. A moveable second member is configured to communicate with a tube. Additional features, embodiments, and benefits will be evident in view of the figures and detailed description presented herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention. In the drawings,

[0007] **Figure 1** illustrates a port access system in which a moveable member is in a first position in accordance with one embodiment of the invention;

[0008] **Figure 2** illustrates a port access system in which the moveable member advances from one position to another position in accordance with one embodiment of the invention;

[0009] **Figure 3** illustrates a third moveable member in its deactivated state in accordance with one embodiment of the invention;

[0010] **Figure 4** illustrates a third moveable member in its activated stated in accordance with one embodiment of the invention;

[0011] **Figure 5** illustrates a shortened third moveable member in a deactivated state in accordance with one embodiment of the invention;

[0012] **Figure 6** illustrates a shortened third moveable member in its activated state in accordance with one embodiment of the invention;

[0013] **Figure 7** illustrates a top view of a port in accordance with one embodiment of the invention;

[0014] **Figure 8** illustrates a port access system with a moveable member in accordance with one embodiment of the invention;

[0015] **Figure 9** illustrates a port access system in a first position in accordance with one embodiment of the invention;

[0016] **Figure 10** illustrates the port access system after the moveable member has been activated to advance from one position to another position in accordance with one embodiment of the invention; and

[0017] **Figure 11** illustrates a port access system after the syringe has been depressed position in accordance with one embodiment of the invention.

DETAILED DESCRIPTION

[0018] A port access system is disclosed that includes a housing having a port that is adapted to receive a moveable first member coupled to a moveable second member. The moveable second member is configured to communicate with a tube.

[0019] The port access system described herein offers several improvements over conventional port access systems. Conventional port access systems involve insertion of a non-coring needle or huber needle that is inserted into a patient and the wings are taped down for infusion of fluids. Because removal of a needle involves a manual process, a patient or a health care worker may be inadvertently harmed by the needle. One aspect of the invention is that the needle is coupled to a moveable member that inserts the needle into the body of the patient and also is able to remove the needle from the patient. This process occurs within the housing of the port access system. This device generally prevents the healthcare worker or the patient from being punctured by a used needle. The following detailed description and accompanying drawings are provided for the purpose of describing and illustrating presently preferred embodiments of the invention only and are not intended to limit the scope of the invention.

[0020] **Figures 1** through **6** illustrate port access system 100 in its deactivated state and its activated state. **Figure 1** illustrates a port access system 100 in a deactivated state in accordance with one embodiment of the invention. Port access system 100 includes housing 110 in which moveable first member 122, moveable second member 130, and third moveable member 102 are located and are connected to housing 110 using conventional means such as securing the moveable members to housing 110 using a strong adhesive, screws, or other suitable means. Alternatively, housing 110 may be configured such that the second moveable member 130, for example, may have sides configured such that the sides of second moveable member 130 slide into a receiving side of housing 110.

[0021] **Figure 1** shows housing 110 adapted to receive a moveable first member and a moveable second member 130. Housing 110 has a diameter

approximately in the range of 1/4 to 3/4 inches. Housing 110 provides a secure location for an access needle. Housing 110 is placed on the patient's chest such that housing 110 surrounds the site in which first member 122 such as a coring or huber needle is used to pierce the patient's skin.

[0001] Housing 110 has wings 160 formed at one end of housing 110. Adhesive may be deposited or placed at the bottom surface of wings 160 which is the surface that is generally opposed to the patient's body. Adhesives such as an acrylic adhesive may be applied to the bottom of a pad made of closed cell foam attached to the underside of the device for patient comfort. Examples of such adhesives are found in Band-Aid™ or Bioclusive™. The bottom surface of wings 160 is placed onto the patient's skin thereby supporting the port access system 100 against the patient's body. Housing 110 is coupled to port 120. Inlet 155 of port 120 connected to housing 110 allows fluids to flow in through tube 150 and exit outlet of non-coring needle 157. Port 120 opens to a funnel-like body 125. Port 120 also communicates with tube 150.

[0023] Moveable second member 130 has a top surface that is located at first position Y_1. A lever 190, located at the top surface of housing 110, moves, rotates, or pivots about point 195. When lever 190 pivots from the first position Y_1 to second position Y_2, a trigger member (not shown) is connected to spring 140, and to moveable second member 130. Spring 140 compresses using conventional techniques allowing the distal tip of first member to pierce the skin of a patient as illustrated in **Figure 2**. Trigger member includes any device capable of causing moveable second member 130 to advance from a first position to a second position.

[0024] **Figure 2** illustrates the port access system 100 after lever 190 has been rotated from a first position Y_2, to a second position Y_{12}. The top surface of moveable second member 130 has moved from position Y_1 to position Y_2. The bottom surface of moveable second member 130 contacts or is close to the skin of the patient. Port access system 100 is now ready for infusion of fluids into a patient. Lever 190 is located adjacent to port 120. Port 120 is configured to receive an intravenous line ("IV"). The IV is inserted through aperture 210. It will be appreciated that port 120 can have a variety of shapes in order to

receive a variety of various shaped IVs. For example, port 120 may have a shape that is substantially rectangular, circular, a triangle or any other suitable shape.

[0025] In one embodiment, the moveable second member 130 may move from its deactivated state to its activated state by using a moveable third member 102. A slot (not shown) exists between moveable third member 102 and moveable second member 130 allowing the coupling member (not shown) between the second and moveable third members (130, 102) to easily move within the slot (not shown). Moveable third member 102, coupled to moveable second member 130, moves from its position shown in **Figure 3** to its position in **Figure 4** using conventional means such as a lever, trigger button, or any other suitable means. A first spring may optionally be used to cause third member 102 to move faster in the horizontal direction. As moveable second and third member (130, 102) moves in a downward direction, second and third springs (104, 106) are energized. Third moveable member 107 snaps into place at locking member 109. Moveable second member 130 advances until the bottom surface of moveable second member 130 contacts or is close to the skin of the patient as shown in **Figure 2**.

[0026] The needle is activated by pressing down on the moveable second member 130 which then allows infusion of the needle with a channel built into the device that connects to a hub or female leur and infusion may begin. When therapy is completed, the moveable first member is deactivated and returns to its original protective housing. The moveable first member may be deactivated using a variety of methods such as returning lever 190 to its first position Y_1 which causes third moveable member 102 to move up by spring 106 returning to a relaxed position. The port access system device is then removed and discarded in accordance with applicable environmental regulations.

[0027] In order for moveable second and third member to return to their original position, locking member 109 is released by a trigger button, a latch that is mechanically disengaged, or other suitable means once treatment is completed. Springs (104, 106) relax causing the moveable second and third member (130, 102) to advance vertically back to its original position.

[0028] **Figures 5** and **6** illustrate yet another embodiment for moving second and third members ((130, 102). **Figure 5** illustrates a shortened third member 103 in a deactivated state. Third member 103 is adjacent to the top inner portion 105 of housing 110. Springs (107, 106) are relaxed. When second moveable member 130 is moved by hand or other suitable means in a downward direction, moveable first member 122 pierces the skin of the patient as illustrated in **Figure 6**. **Figure 6** also illustrates the top of third moveable member resting against top inner portion 105 of housing 110. Springs (106, 107) are energized causing the bottom portion of moveable third member 103 to move away from the inner portion of housing 110.

[0029] Second moveable member 130 returns to its deactivated position when the top portion of third moveable member 103 is pushed or pulled toward the center of housing 110 causing spring 107 to return to its energized position. Spring 106 returns to its relaxed position and pushes moveable second member 130 back to its deactivated position.

[0030] It will be further appreciated that there are numerous ways in which to cause moveable second member 130 to move. For example, moveable second member 130 may be moved from a first position to a second position by a person simply contacting with his or her hand the top surface of moveable member 130. Alternatively, the moveable member 130 may be coupled to a device that allows a person to activate it by contacting an activation button (not shown). The activation button may be a button coupled to a moveable second member 130 that causes the moveable first member 122 to move from its first position in a deactivated state to its second position activated state using conventional means.

[0031] **Figure 7** illustrates a top view 300 of port 120 of funnel-like body 125. Protruding members 320 allow for attachment by a device used to place fluids into a body of a patient. This allows the funnel-like body to be securely in place while an IV is inserted through port 120 and liquids are placed into the IV that is inserted into the patient. Aperture 310 allows IV to lock into place. Upon the IV locking into place, a clicking noise may be heard.

[0032] **Figure 8** illustrates a port access system 400 that includes housing 410 which has a bottom surface that contacts the skin of the patient. Housing 410 has a lever 490 that may be moved from position Y_3 to X_1 in accordance with one embodiment of the invention. This results in moveable member 430 to drop to position Y_4 such that the bottom surface 440 comes close to the skin of the patient. A substantially circular opening 420, which receives fluids, transitions to funnel-like body 425 that receives the fluid(s) that enter port 420. Inlet 455 of funnel-like body 425 allows fluids to flow in through tube portion 450 and then into the shaft of the needle after the needle has been inserted into the patient's body. In this embodiment, tube portion 450 and the shaft of the needle are in a substantially straight alignment in contrast to the angled alignment shown in **Figures 1-2**.

[0033] **Figures 9-11** illustrate another embodiment of port access system 500 that includes housing 510 which provides a secure location for needle 525. In this embodiment, syringe 550 is attached to needle 525. Needle 525 is secured to moveable member 530. Compression member 540 is coupled to plunger 547 of syringe 550. **Figure 9** illustrates moveable member 530 is in a deactivated state in position Y_5 in which the top surface of moveable member 530 is located at position Y_5.

[0034] **Figure 10** illustrates that moveable member 530 has moved from a first position Y_5 to position Y_6 using conventional means. As a result, needle 525 has punctured the skin and entered a blood vessel or tissue of the patient. **Figure 11** illustrates the same device as in **Figure 10** except the plunger 547 has been depressed using conventional means such as pushing directly on compression member 540 or alternatively, compression member 540 is automatically pushed down once activation button 580 is depressed. Port access system 500 is then removed and disposed of in accordance with environmental regulations.

[0035] In the preceding detailed description, the invention is described with reference to specific embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention as set forth in the

claims. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.